



U.S. Department of Energy
Energy Efficiency and Renewable Energy



President's Hydrogen Fuel Initiative

April 3, 2003

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Hydrogen, Fuel Cells and
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U.S. Department of Energy
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President Bush Launches the Hydrogen Fuel Initiative

"Tonight I am proposing \$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles.

"A simple chemical reaction between hydrogen and oxygen generates energy, which can be used to power a car producing only water, not exhaust fumes.

"With a new national commitment, our scientists and engineers will overcome obstacles to taking these cars from laboratory to showroom so that the first car driven by a child born today could be powered by hydrogen, and pollution-free.

"Join me in this important innovation to make our air significantly cleaner, and our country much less dependent on foreign sources of energy."

2003 State of the Union Address
January 28, 2003

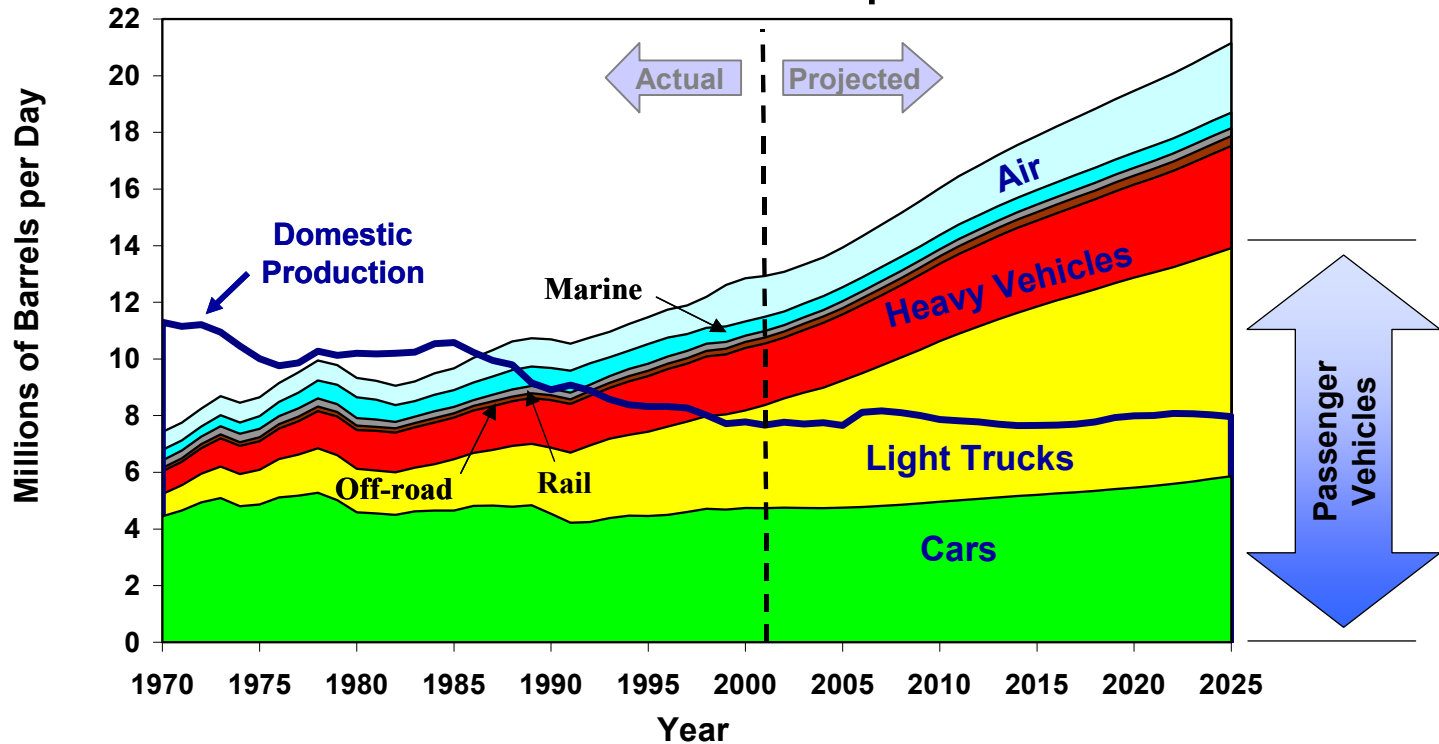




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U.S. Energy Dependence is Driven By Transportation

US Oil Use for Transportation



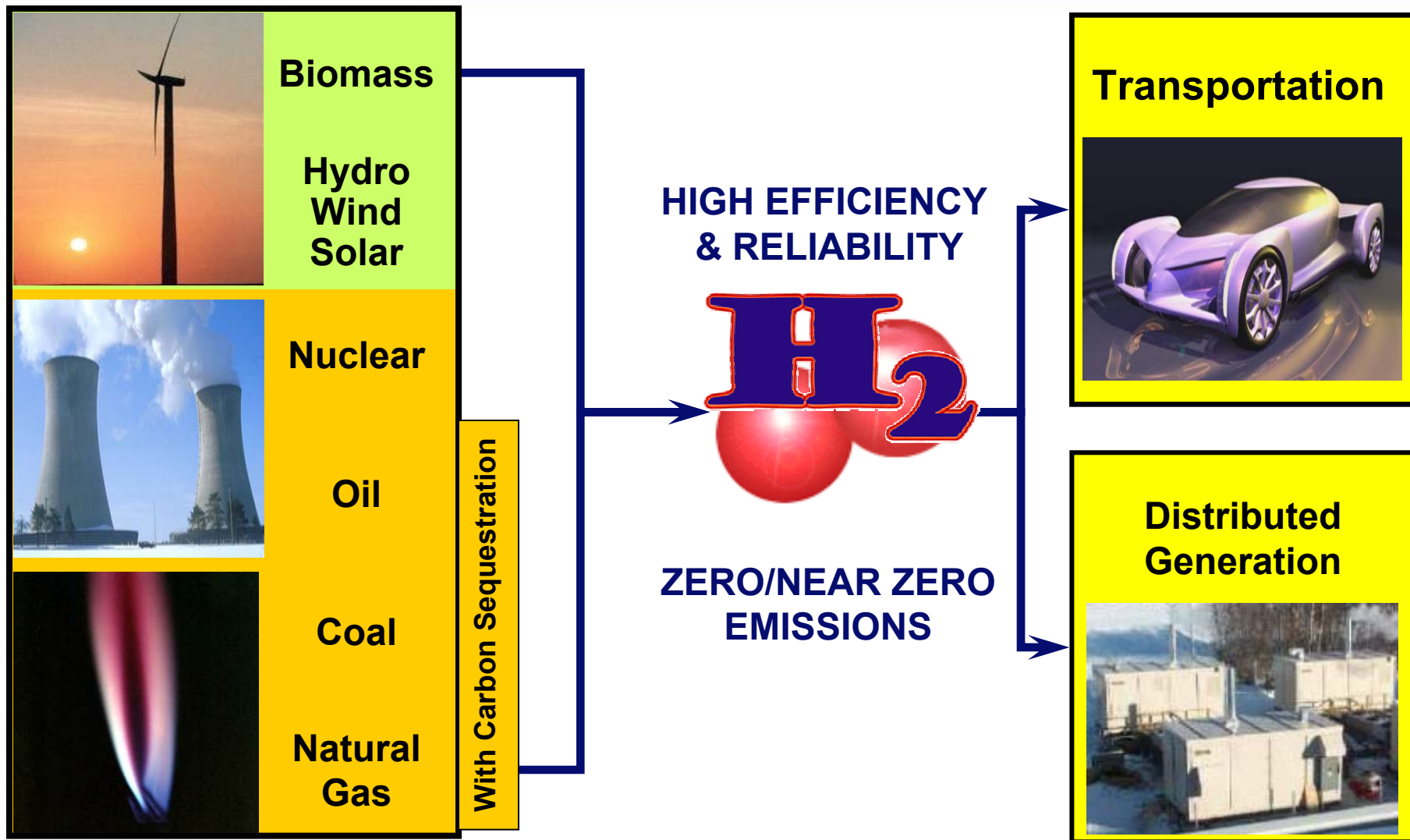
Source: Transportation Energy Data Book: Edition 22, September 2002,
and EIA Annual Energy Outlook 2003, January 2003

- Transportation accounts for 2/3 of the 20 million barrels of oil our nation uses each day.
- The U.S. imports 55% of its oil, expected to grow to 68% by 2025 under the status quo.
- Nearly all of our cars and trucks currently run on either gasoline or diesel fuel.



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***Why Hydrogen?** It's abundant,
clean, efficient, and can be derived
from diverse domestic resources.*





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President's Hydrogen Fuel Initiative Complements FreedomCAR

- Freedom from foreign petroleum dependence
- Freedom from pollutant and carbon dioxide emissions
- Freedom for Americans to drive where they want, when they want, in the vehicle of their choice
- Freedom to obtain fuel affordably and conveniently



On January 9, 2002, Energy Secretary Abraham announced the FreedomCAR Partnership

FreedomCAR and Fuel Initiative





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Hydrogen Infrastructure and Fuel Cell Technologies put on an Accelerated Schedule

- President Bush commits \$1.7 billion over first 5 years:
 - ❖ \$1.2 billion for hydrogen and fuel cells RD&D (\$720 million in new money)
 - ❖ \$0.5 billion for hybrid and vehicle technologies RD&D
- Accelerated, parallel track enables industry commercialization decision by 2015.

Fuel Cell Vehicles in the Showroom and Hydrogen at Fueling Stations by 2002





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The President's FY04 Budget Request for FreedomCAR and Hydrogen Fuel Initiatives

Organization	Million \$
Hydrogen, Fuel Cells & Infrastructure Technologies Program (EERE)	165.5
FreedomCAR and Vehicle Technologies Program (EERE)	91.1
Office of Fossil Energy (FE)	11.5
Office of Nuclear Energy, Science and Technology (NE)	4.0
Department of Transportation (RSPA)	0.7
<i>Total</i>	<i>272.8</i>



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Fiscal Year 2004 Hydrogen Production Funding (\$38.5M)

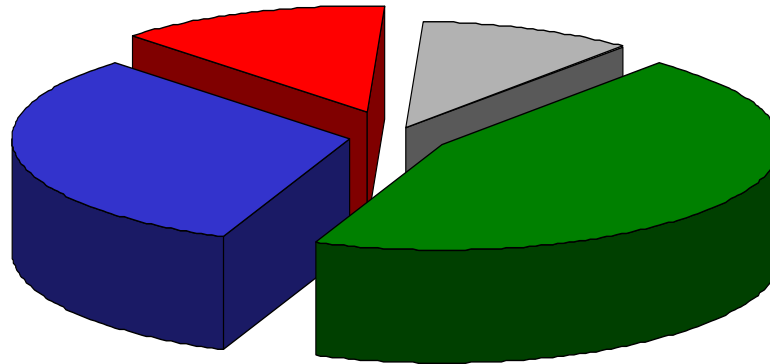
The Department of Energy's Offices of Fossil Energy, Nuclear Energy, and Energy Efficiency and Renewable Energy are collaborating on cost-shared hydrogen production R&D:

Coal - \$5 million (FE)

- Separation of pure hydrogen gas from synthesis gas (CO and hydrogen)
- Technologies also applicable to biomass feedstocks

Nuclear - \$4 million (NE)

- High temperature chemical cycles for splitting water



Natural Gas – \$12.2 million (FE/EERE)

- Small, distributed systems to begin making hydrogen available at local refueling stations
- Centralized Production

Renewables - \$17.3 million (EERE)

- Direct water splitting using solar energy
- Thermal processes using biomass
- Advanced electrolysis from wind power
- Biological WGS Processes

Energy Independence through Diversity of Domestic Supplies



Hydrogen Technology

<i>Key Activity</i>	FY 02	FY 03	FY 04 Req.	'04 Comments
<i>Energy & Water Appropriations in \$ Millions</i>				
Hydrogen Production & Delivery*	\$11.2	\$11.8	\$23.0	Distributed natural gas reformers, and separation technologies, more emphasis on renewable production (\$6M to \$17M)
Hydrogen Storage	\$6.1	\$11.3	\$30.0	Critical path technology! Expands current R&D and initiates research on advanced concepts such as conducting polymers and nanostructured materials.
Infrastructure Validation	\$5.7	\$10.1	\$13.2	Increase for hydrogen refueling stations in support of controlled fleet demonstration project
Safety, Codes & Standards, Utilization	\$4.5	\$4.8	\$16.0	Expands R&D efforts to develop critical engineering data for C&S and hydrogen safety
Education and Cross-Cutting Analyses	\$1.4	\$2.0	\$5.8	Initiates national campaign to communicate hydrogen benefits and barriers. Includes only cross-cutting life cycle analysis
TOTAL	\$28.9	\$40.0	\$88.0	

* EERE program activities (excludes FE (\$11.5M) and NE (\$4M) for FY 2004)



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Fuel Cell Technology

<i>Key Activity</i>	FY 02	FY 03	FY 04 Req.	'04 Comments
<i>Interior Appropriations in \$ Millions</i>				
Transportation Systems	\$7.5	\$6.2	\$7.6	More emphasis on balance of plant systems components such as air compressors, blowers, heat exchangers, sensors, and APU's
Distributed Generation Sys.	\$5.5	\$7.5	\$7.5	System durability issues, fuel processor integration and balance of plant component development
Stack Component R&D	\$12.6	\$14.9	\$28.0	Emphasize basic membrane materials work, advanced catalysts/non-precious metal catalysts materials/manufacturing.
Fuel Processor R&D	\$20.9	\$24.7	\$19.0	Decrease reflects reduced mortgages, approaching FY04 go/no go decision. Supports natural gas/propane fuel processing for distributed generation.
Technology Validation	\$0	\$1.8	\$15.0	Significant increase represents first year of vehicle test and evaluation program
Technical Support	\$0.2	\$0.4	\$0.4	
TOTAL	\$46.7	\$55.5	\$77.5	



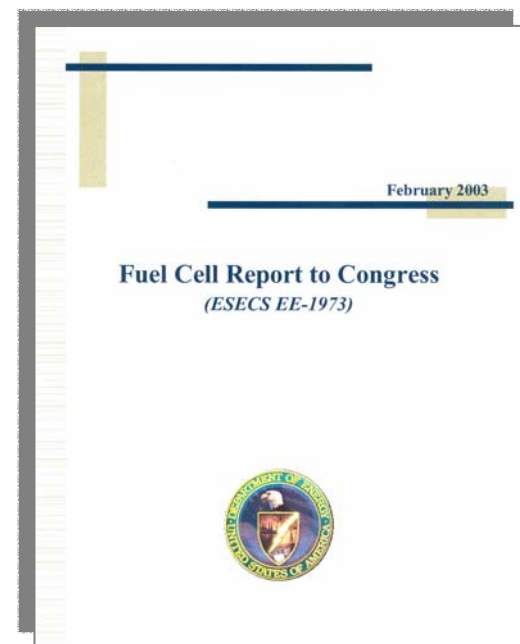
Fuel Cell Report to Congress

Need for Public/Private Partnerships

- Stationary and Distributed Generation to continue robust research activities to
 - lower costs and improve durability, and
 - establish field evaluations.
- Transportation and Infrastructure to establish learning demonstrations of fuel cell vehicles and hydrogen infrastructure.

Program Adjustments

- Increased emphasis on hydrogen production and delivery infrastructure, storage, codes and standards development, and education.





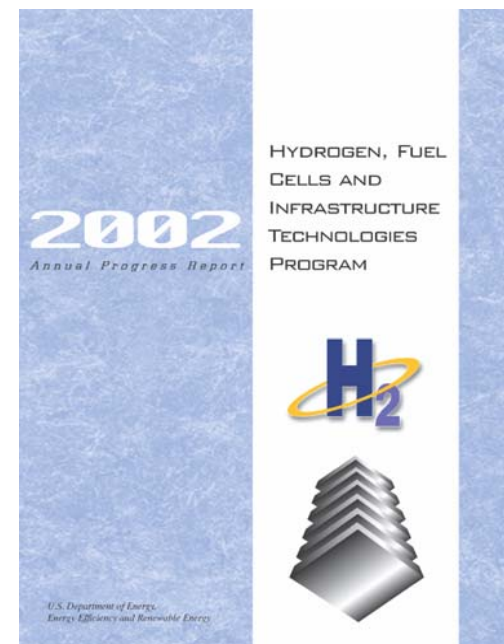
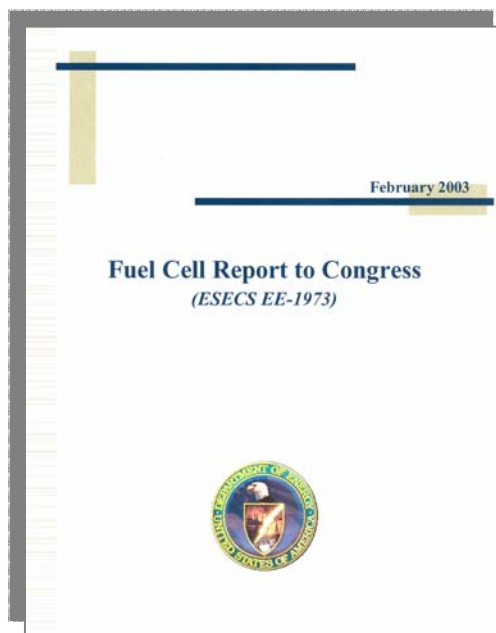
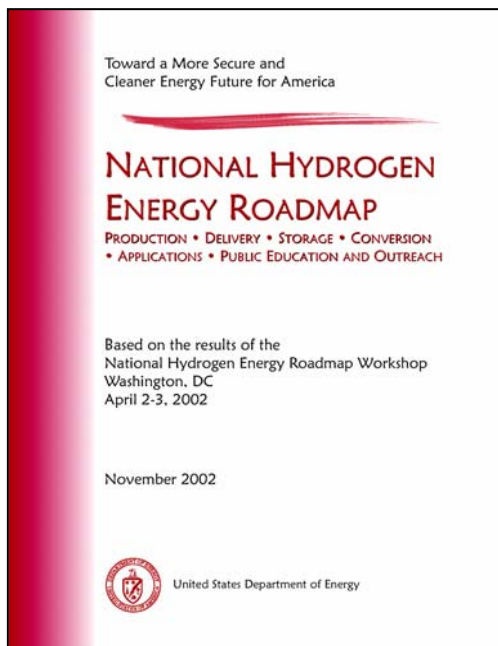
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www.eere.energy.gov/hydrogenandfuelcells